

Linear Equations Review Guide

Question #1:

Find the equation of the line passing through points $(1, 5)$ and $(-3, -4)$

There are two steps to finding the equation of a line if you are given two points.

Step #1: Find the slope - (The slope is also known as "m".)

Step #2: Find the y-intercept (The y-intercept is also called "b".)

The equation of a straight line is $y = mx + b$

\uparrow Find Step #1 \uparrow Find Step #2

Step #1: The slope is found by calculating the change in $y \div$ by the change in x .
another way of writing this is: $m = \frac{\Delta y}{\Delta x}$

The points for this Question are: $(1, 5)$ and $(-3, -4)$

$$m = \frac{\Delta y}{\Delta x} = \frac{-9}{-4}$$

$m = \frac{9}{4}$

points: $(1, 5)$ and $(-3, -4)$

$\Delta y = -9$ (vertical change)
 $\Delta x = -4$ (horizontal change)

- since the value of y goes down 9, the change is -9 .
- since the value of x goes down 4, the change is -4 .
- since a negative \div negative is a positive the slope is $9/4$.

Question 1 continued:

STEP 2: Finding y-intercept.

Here is our known information:

Points: $(1, 5)$; $(-3, -4)$

Slope (m): $\frac{9}{4}$

- So far we know that our equation looks like this:

$$y = \frac{9}{4}x + b \quad \leftarrow \text{we want to find "b"}$$

→ To find "b" we need to take a point on the line and place those values for x & y into the equation.

→ Once the values are put into the equation, use inverse operations to find out the value of "b".

* use point $(1, 5)$

$$y = \frac{9}{4}x + b$$

$x = 1$
 $y = 5$

$$5 = \frac{9}{4}(1) + b$$

$$5 = \frac{9}{4} + b$$

$$- \frac{9}{4} \quad - \frac{9}{4}$$

$$b = 5 - \frac{9}{4}$$

$$b = \frac{20}{4} - \frac{9}{4}$$

$$b = \frac{11}{4}$$

Final Equation

Slope: $\frac{9}{4}$ y-intercept: $\frac{11}{4}$

$$y = \frac{9}{4}x + \frac{11}{4}$$

or

$$y = 2\frac{1}{4}x + 2\frac{3}{4}$$

Question #2

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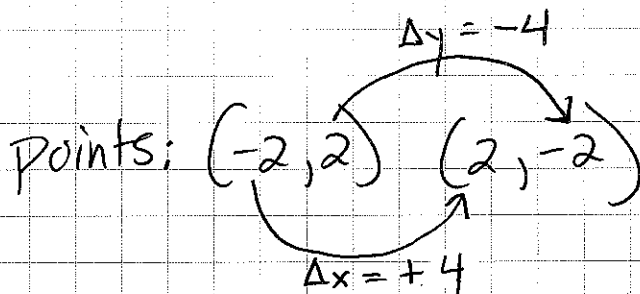
What is the equation of the line passing through points $(-2, 2)$ and $(2, -2)$

* use the same process as Question #1.

Step #1: Find slope

$$m = \frac{\Delta y}{\Delta x} = \frac{-4}{+4} = -1$$

$$m = -1$$



Step #2: Find y-intercept

* use point $(-2, 2)$

$x = -2$
 $y = 2$
 $m = -1$ } put these into the equation.

$$\begin{aligned} y &= mx + b \\ 2 &= -1(-2) + b \\ 2 &= 2 + b \\ -2 &\quad -2 \\ b &= 0 \end{aligned}$$

Final Equation:

$$y = -x + 0$$

Since "b" is "0" we can leave it off.

$$y = -x$$

Question #3

Give the slope and y-intercept for $y = \frac{1}{5}x + 7$

The equation for a straight line is: $y = mx + b$

↑ slope ↑ y-intercept

So... $y = \frac{1}{5}x + 7$

$$\text{Slope: } \frac{1}{5} \quad \text{y-intercept: } 7$$

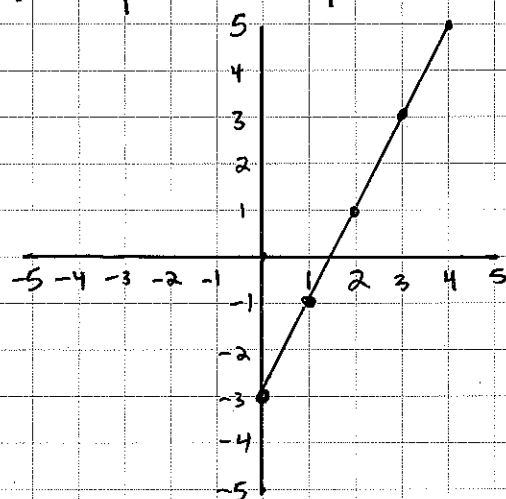
Question #4

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Make a T-chart/Data Table showing x & y , then Graph the equation $y = 2x - 3$.

x	y	Calculations
0	-3	$y = 2(0) - 3 = 0 - 3 = -3$
1	-1	$y = 2(1) - 3 = 2 - 3 = -1$
2	1	$y = 2(2) - 3 = 4 - 3 = 1$
3	3	$y = 2(3) - 3 = 6 - 3 = 3$
4	5	$y = 2(4) - 3 = 8 - 3 = 5$

→ Graph these points.



Teb's tip:

- When you are making a t-chart you can choose any values of "x" you want to help you figure out "y". Your "x" values can be positive or negative. Try and choose "x" values that will allow you to easily graph the points.

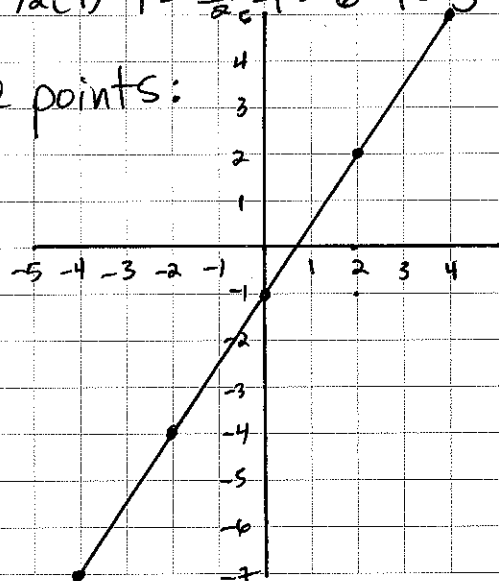
Question #5

Make a T-chart then graph:

$$y = \frac{3}{2}x - 1$$

x	y	Calculations
0	-1	$y = \frac{3}{2}(0) - 1 = 0 - 1 = -1$
-4	-7	$y = \frac{3}{2}(-4) - 1 = -6 - 1 = -7$
-2	-4	$y = \frac{3}{2}(-2) - 1 = -3 - 1 = -4$
2	2	$y = \frac{3}{2}(2) - 1 = 3 - 1 = 2$
4	5	$y = \frac{3}{2}(4) - 1 = 6 - 1 = 5$

Graph the points:



Question #6

Write the equation of the line that has a y-intercept of -2 and a slope of $\frac{1}{2}$.

Since you only need the slope & y-intercept to write a linear equation this is easy.

$$m = -2$$

$$b = \frac{1}{2}$$

$$y = mx + b$$

$$y = -2x + \frac{1}{2}$$

Question #7

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Write the equation of the line that has a y-intercept of 5 and a slope of zero (0).

$$m = 0$$
$$b = 5$$

$$y = mx + b$$

$$y = 0x + 5$$

since zero multiplied by any # is zero....

$$y = 0 + 5$$
$$\boxed{y = 5} \leftarrow \text{final equation.}$$

Question #8

Write the equation of the line passing through (6,3) and has a slope of $\frac{1}{2}$.

→ since you are given slope, you are trying to find the y-intercept.

→ use the same procedure to find "b" as you used in Questions #1 & #2.

Find y-intercept: use the given point (6,3)

$$x: 6$$
$$y: 3$$
$$m: \frac{1}{2}$$

$$y = mx + b$$

$$3 = \frac{1}{2}(6) + b$$

$$3 = \frac{6}{2} + b$$

$$\cancel{3} = \cancel{3} + b$$

$$b = 0$$

Final Equation:

$$y = \frac{1}{2}x + 0 \leftarrow \text{leave off, zero!}$$

$$\boxed{y = \frac{1}{2}x}$$

Question #9: write equation of line of slope -2: point (-3,9)

Find y-intercept: use point (-3,9)

$$x: -3$$

$$y: 9$$

$$m: -2$$

$$y = mx + b$$

$$9 = -2(-3) + b$$

$$9 = 6 + b$$

$$\cancel{-6} \quad \cancel{-6}$$

$$3 = b$$

$$\boxed{\text{Final equation: } y = -2x + 3}$$

Question #10

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Write the equation of the line that passes through $(-3, -8)$ and is parallel to $y = 6x + 1$.

→ This seems tricky at first. Think... how would the equations for two parallel lines look similar?

* wouldn't they have the same slope?

→ so this Question is done exactly like #8 & #9 since the parallel line will also have a slope of 6.

Find y-intercept: use point $(-3, -8)$

$$\begin{array}{l} x: -3 \\ y: -8 \\ m: 6 \end{array} \quad \begin{array}{l} y = mx + b \\ -8 = 6(-3) + b \\ -8 = -18 + b \\ +18 \quad +18 \\ 10 = b \end{array}$$

Final equation: $y = 6x + 10$

Question #11 A: Same steps as #1 & #2

→ choose 2 points on the line that are at a grid intersection:

Points $(0, 2)$ & $(3, 0)$ will work

Step #1: Find slope: $(0, 2)$ $(3, 0)$

$$m = \frac{\Delta y}{\Delta x} = \frac{-2}{+3} = -\frac{2}{3}$$

Step #2: Find y-intercept: use point $(3, 0)$

$$\begin{array}{l} x: 3 \\ y: 0 \\ m: -\frac{2}{3} \end{array} \quad \begin{array}{l} y = mx + b \\ 0 = -\frac{2}{3}(3) + b \\ 0 = -2 + b \\ +2 \quad +2 \\ 2 = b \end{array}$$

Final Equation: $y = -\frac{2}{3}x + 2$

Question #11 B: Same steps as #1 & #2

use points $(-5, 0)$ & $(-3, -4)$

Step #1: Find slope

$$m = \frac{\Delta y}{\Delta x} = \frac{-4}{2} = -2$$

Step #2: Find y-intercept: use point $(-5, 0)$

$$\begin{array}{l} x: -5 \\ y: 0 \\ m: -2 \end{array} \quad \begin{array}{l} y = mx + b \\ 0 = -2(-5) + b \\ 0 = 10 + b \\ -10 \quad -10 \\ b = -10 \end{array}$$

Final equation: $y = -2x - 10$

Tebbo's Tip:

- when you can see the y-intercept by just looking at the graph you don't need to do step #2. I did it just to show all steps.